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NAVY DEPARTMENT

BUMED NEWS LETTER

a digest of timely information

Editor - Captain F. W. Farrar, (MC), U.S.N.

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TABLE OF CONTENTS

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(Not Restricted)

A Survey of Cases of Intestinal Obstruction During a Ten-Year Period: Recently a review was carried out of all cases in which the diagnosis of intestinal obstruction was made on the Service of the senior author at the Hospital of the University of Pennsylvania during the ten-year period, 1934-1943. It was hoped, first, that certain well-recognized features of intestinal obstruction could be re-emphasized, e.g., the high mortality associated with strangulation, advanced age, delayed treatment, etc., and, second, that statistical evidence would be obtained to support a clinical impression that the mortality in intestinal obstruction has been reduced in the past ten years by improved treatment, such as the use of intestinal suction-drainage by means of the Miller-Abbott tube. During this ten-year period, there were 292 patients who either were admitted with the primary diagnosis of obstruction or developed obstruction as a complication during hospitalization. Of all surgical deaths at the Philadelphia General Hospital, 17 per cent resulted from intestinal obstruction.

In the cases surveyed, the youngest patient was six weeks old, the oldest 84 years. The average age of all 292 patients was 45 years. Of the group who survived, the average age was 44 years; of those who died, 59. A high percentage of cases of obstruction in the older age group was due to a complication of carcinoma, the nature of which in itself contributes further to the increased mortality in this group.

Only partial obstruction was present in a little more than half (60 per cent). The mortality in this group, 10 per cent, however, was only slightly lower than in those, 12 per cent, who had complete obstruction. The mortality among the partially obstructed was increased because of the cases of carcinoma included. The cases were quite evenly divided between those in whom the disease was acute and those in whom it was chronic. The mortality in the two groups was exactly the same, 11 per cent, which corresponded to the mortality for the entire series of 292.

In the series of acute cases the average duration of symptoms for those who died was 2.6 days, and for those who lived, 2.3 days. The average delay of 2.5 days before hospitalization in this series is still too long and unnecessarily increases the mortality in acute obstruction. Unfortunately, delay sometimes occurs even after admission to the hospital. In the face of a typical history and findings on physical examination suggesting intestinal obstruction, treatment should not be deferred even though a typical roentgenogram is not found. The burden of the diagnosis and the resultant decision on treatment should not be placed solely on the roentgenologist.

The mortality in those with small bowel obstruction, 8 per cent, was only half that in those with large bowel obstruction, 16 per cent. Carcinoma of the large intestine no doubt accounts for the higher mortality in the latter group.

(Not Restricted)

A table showing the causes of obstruction and the mortality in this series follows:

	No.	Died	Mortality
Adhesions	79 (27%)	4	5%
Carcinoma	59 (20%)	20	34%
Lymphopathia venereum	41 (14%)	0	0%
Inguinal hernia	41 (14%)	2	5%
Femoral hernia	13 (4%)	4	31%
Ventral hernia	8 (3%)	0	0%
Internal hernia	5 (2%)	1	20%
Others	46 (16%)	1	2%

Of the 292 cases, 33 (11 per cent) were instances of postoperative obstruction.

No patient with lymphopathia venereum died. The procedure carried out in this disease was usually a palliative one, such as a simple loop-colostomy or a Lahey-type of colostomy.

Obstructions in 23 per cent of the cases were due to a hernia. It is seen that the inguinal region was the most common site, and carried a mortality of only 5 per cent. In contrast, the mortality in the group with femoral hernia was very high, 31 per cent. Failure to recognize promptly the nature of the disability tends to occur in femoral hernias, especially if a Richter's type is present or if the patient is obese. At operation, one should never hesitate to divide the inguinal ligament if necessary to reduce the hernia. It is sometimes of value to expose the bowel from above by extending the wound and entering the peritoneal cavity through a muscle-splitting incision. Failure to follow these two suggestions leads at times to unnecessary trauma or rupture of an already strangulated intestine, causing further contamination of the peritoneal cavity and increased operative mortality.

Ninety-two per cent of the deaths resulted in cases of obstruction due to malignant growths, femoral hernia, inguinal hernia and adhesions. Malignant growths accounted for 20 per cent of the cases, but 63 per cent of the deaths. Femoral hernias accounted for 4 per cent of the cases, but 13 per cent of the deaths. These two conditions, therefore, were responsible for 24 per cent of the cases of obstruction, but 75 per cent of the deaths.

Strangulation at the time of operation was evident in 74 cases (25 per cent); in this group death resulted in only 12 per cent.

(Not Restricted)

As might be expected, the mortality in that group of cases in which resection was required, was almost double that of the total series, 19 per cent versus 11 per cent.

If the cases of malignant growths (which account for 20 of the 32 deaths in this series) and the cases of strangulation (which account for nine of the 32 deaths) are omitted, then the mortality in the remaining group of 159 cases of obstruction is only 1 per cent (three deaths). The prognosis, therefore, is excellent if a patient is admitted with obstruction, but has no evidence of cancer or strangulation.

The causes of death are shown in the table which follows:

	No.	Per Cent
Peritonitis	8	25%
Carcinomatosis	7	22%
Pulmonary embolism	5	16%
Pneumonia	4	13%
Cardiovascular-renal disease	3	9%
Others	5	16%

Two of the patients in this series were moribund at the time of admission, and would not respond sufficiently to supportive treatment to permit operation.

Suction drainage of the gastro-intestinal tract by means of the Jutte Levin, or Miller-Abbott tube was carried out in 124 of the 292 cases as an adjunct in the treatment. In general, suction drainage was reserved for use in the more serious cases. The clinical impression was that this procedure was of value in from 80 to 90 per cent of the cases in which it was used. Twenty-five per cent of the patients in whom suction drainage was carried out required no subsequent operative procedure. Postoperative obstruction developing on the basis of fresh adhesions is a particularly fertile field for the use of intubation as a corrective measure which might make possible avoidance of the necessity for subsequent operation. During the three-year period, 1934-1936, suction drainage was carried out in 26 cases by means of a Jutte or Levin tube placed in the stomach. Eight of these patients succumbed, a mortality of 31 per cent. In 1937 the Miller-Abbott tube became available for use in decompression of the small intestine. During the seven-year period, 1937-1943, this tube was used in 65 instances of obstruction, with ten deaths, a mortality of 15 per cent. In another 33 cases gastric suction drainage by means of the Jutte or Levin tube was used; five deaths occurred. During this seven-year period, following the introduction of the Miller-Abbott tube, therefore, there were 98 cases in which suction-drainage was used, with a mortality of 15 per cent in contrast to the mortality of 31

(Not Restricted)

per cent prior to the introduction of the Miller-Abbott tube. The over-all mortality during the last seven years is 9 per cent versus 11 per cent for the entire ten-year period, indicating the trend toward continued improvement in mortality figures in the latter part of this series.

Although a sharp fall in mortality was associated with the introduction of the Miller-Abbott tube, the improvement in prognosis must not be attributed to use of the tube alone. Other important factors have been the better restoration and maintenance of proper body chemistry and fluid balance made possible through frequent blood chemistry studies and the use of fluids and blood substitutes; the sulfonamide compounds; penicillin and streptomycin; and the services of an anesthesiologist.

In 18 per cent of the cases in which the Miller-Abbott tube was used, success was not had in getting the tube to pass into the small intestine. More recently, this failure occurred in less than 10 per cent. These figures represent the efforts of several people, some of whom have had little experience with the tube. In some of these failures, persistent effort would no doubt have been successful in passing the tube, but the condition of the patient did not justify further delay in operative intervention. In acute mechanical obstruction, if passing the tube is not accomplished promptly, the question arises of how long attempts should be made to get it to pass. In general, if success has not resulted after six hours, as shown by roentgenographic evidence of progression of the tube, decrease in distention, disappearance of pain, and slower pulse rate, then operation is indicated. If delay in operation is too long because of attempts to pass the tube, the patient becomes exhausted, the pulse rate rises, and peristalsis disappears. Such a patient then becomes a poor surgical risk.

In the face of marked distention which cannot be handled by intubation for any reason, a Witzel enterostomy in the left lower quadrant, under local anesthesia and with a muscle-splitting incision, still remains the procedure of choice and will give excellent results in most cases. In one report, 86 per cent of the obstructions following operations for appendicitis were corrected by enterostomy alone.

There is no doubt that the value of the Miller-Abbott tube increases in proportion to the experience and skill of the individual who is passing the tube. The authors state that one individual in the hospital who has had a wide experience in the use of this tube has been successful in 75 of the last 76 attempts. Although passage of the tube can be accomplished in the patient's room, fluoroscopic guidance is a distinct advantage, and often saves much time, since any error in direction of the tube into the duodenum can be

promptly corrected. Use of a stylet in the tube or mercury placed in the balloon may aid in more rapid passage of the tube into the duodenum. Once the tip of the tube reaches the second portion of the duodenum, the balloon can be inflated with air and further passage of the tube to the point of obstruction is usually accomplished without difficulty. Occasionally gastric distention recurs while the tube is in the small intestine. This can easily be treated by placing a Levin tube in the stomach and emptying it by suction. If delay in operation is not justified or if the tube fails to pass and operation is necessary, it is frequently possible during the operation to pass the tube manually from the stomach into the small intestine, and thereby obtain postoperative decompression of the intestinal tract.

At an operation in which a Miller-Abbott tube has been passed, the small intestine is often found to be pleated or accordionized on the tube. When removal of the tube is indicated, the balloon must be deflated and the tube withdrawn slowly, usually six inches every 15 to 30 minutes, in order to avoid the possibility of retrograde intussusception.

The Miller-Abbott tube is a useful adjunct in the treatment of intestinal obstruction but cannot replace surgery in all cases. Certain cases of intestinal obstruction are not suitable for use of intubation, and actual harm may result with increased mortality if, improperly, the tube is used and delay in operation results.

Large bowel obstruction requires decompression by operative intervention and should not be attempted by intubation. The Miller-Abbott tube often will not pass into the large bowel, and if it does, the contents of this part of the intestine may be too thick to be drained adequately through the small lumen of the tube. If the ileocecal valve is competent, a closed-loop type of obstruction is present. This is very serious and requires prompt correction. If small bowel distention also is present, this can be handled by intubation, but operative decompression of the large intestine is not thereby avoided. Following operation, the small bowel distention is automatically corrected, so that intubation in these cases is usually unnecessary.

Strangulation is a strict contraindication for delay in surgery for the purpose of attempting to intubate the small intestine. Constant severe pain with exacerbations requiring morphine, tenderness, and perhaps a tender mass, tachycardia, and leukocytosis should be warning signs to prepare the patient for operation as promptly as possible. If the strangulation has progressed to an irreversible stage, so that resection is necessary, the procedure of choice (either a double-barrelled enterostomy or primary anastomosis) must be determined at the time of operation. If primary anastomosis is carried out and the site of repair is under any question, the anastomosis

(Not Restricted)

may be temporarily exteriorized or a proximal enterostomy may be performed. A procedure preferable to either one of these, however, is passage of the Miller-Abbott tube to a point proximal to the site of the anastomosis. Satisfactory decompression of the bowel can be maintained in this fashion and the suture line protected against distention during the early stages of healing. Fluids by mouth can be administered during this time, since the tube will remove all fluid and gas before they reach the site of anastomosis. (Ann. Surg., Jan. '47 - E. L. Eliason and R. F. Welty)

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Myanesin, A New Muscle-Relaxing Drug: During an extensive investigation of the chemical and pharmacological properties of glycerol ethers the observation was made that $\alpha:\beta$-dihydroxy-γ-(2-methylphenoxy)-propane, subsequently named "Myanesin," caused muscular relaxation and paralysis. A few other α-substituted glycerol ethers were found to possess similar pharmacological properties, but myanesin was the most potent and the safest of all the compounds examined.

Myanesin is a colorless, odorless, crystalline solid with a melting-point of from 70° to 71° C. Its solubility in water at 22° C. is 1.09 Gm. per 100 ml. of water, but stable supersaturated solutions can easily be obtained by cooling solutions prepared at higher temperatures. Myanesin is very soluble in alcohol and propylene glycol. It is a neutral solid, and the pH of its solution is practically the same as that of the pure solvent. Urea and its derivatives, particularly ethyl urea, greatly increase the water-solubility of myanesin. Solutions of myanesin are stable and unaffected by light, air, cold, and dilute acids and alkalis; they can be sterilized by heat or filtration and are compatible and freely miscible with solutions of sodium chloride, glucose, and derivatives of barbituric and thiobarbituric acids.

Pharmacological Properties: Effect on Muscles. Rabbits injected intravenously with from 10 to 12 mg. per kg. of body weight showed muscular relaxation. Doses of from 30 to 50 mg. per kg. produced flaccid paralysis without loss of consciousness. The rabbits regained muscular power from 5 to 10 minutes after injection and remained well. Larger doses caused paralysis of longer duration. Doses of 350 mg. per kg. were tolerated when injected over a period of 30 minutes. Myanesin has a low toxicity and a distinct margin of safety. The mean lethal and mean paralyzing doses in mice after intraperitoneal administration were 610 $\pm$ 10 mg. per kg. and 178 $\pm$ 8 mg. per kg. respectively. Excitement, tremors, or convulsions did not develop at any time after administration of myanesin.

Myanesin was quickly detoxified and broken down in the body. It did not exert a cumulative action and did not cause habituation. It also had a weak

(Not Restricted)

curare-like action when administered in large and nearly lethal doses. In dilutions of 1:10,000 it did not affect the isolated guinea pig's ileum or rabbit's duodenum.

Effect on Blood Pressure and Respiration. Intravenous injections of 30 mg. to rabbits or cats did not influence blood pressure or respiration. Larger doses caused a fall of blood pressure and a decrease in rate and an increase in depth of the respiratory movements. Toxic doses caused death by respiratory paralysis.

Anticonvulsant Action. Myanesin, in doses insufficient to cause paralysis, had a strong antagonistic action against strychnine convulsions and was in this respect much superior to hexobarbitone. In convulsions produced by leptazol, hexobarbitone was very effective and myanesin relatively ineffective. These observations suggest that the pharmacological actions of myanesin are due to its depressant action on the spinal cord.

Potentiating Effect on Barbiturate Anesthesia. Simultaneous injection of an ineffective dose of myanesin and an ineffective dose of soluble hexobarbitone caused deep narcosis without excitement in the prenarcotic stage and with complete muscular relaxation during narcosis. The depth and duration of anesthesia could also be increased by the administration of small doses of myanesin. Myanesin also effectively suppressed prenarcotic excitement and muscular fibrillations or spasms during anesthesia.

The experimental results indicate that the administration of myanesin together with barbiturates in amounts only sufficient to produce unconsciousness causes profound muscular relaxation without the disadvantages inherent in the use of deep general anesthesia, spinal anesthesia, or curare. Myanesin may be worthy of clinical trials in the treatment of spastic paralysis and dystonic states and for the prevention of traumatic complications in convulsive shock therapy. (Lancet, Jan. 18, '47 - F. M. Berger and W. Bradley, working in the Research Dept. of the British Drug Houses Ltd, London)

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Clinical Study of Myanesin: F. Barnett Mallinson, senior anesthetist, Memorial Hospital, Woolwich, and anesthetist at the Princess Beatrice and National Dental (University College) hospitals in England, is making a clinical study of the use of myanesin in anesthesia. The following material is contained in a preliminary report on the use of this new drug in the first 112 surgical cases in which it was used during various operative procedures in this study:

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As with most anesthetic agents, premedication is desirable but not essential.

In abdominal surgery, after anesthesia has been established, from 5 to 10 c.c. of myanesin is injected intravenously a few seconds before the peritoneum is opened. Full relaxation follows in a few seconds. Doses of from 5 to 10 c.c. may be repeated as often as required during long operations. In an exceptional case as much as 50 c.c. has been used during a long operation without the slightest postoperative effect. Doses that are adequate even for high abdominal surgery rarely if ever produce intercostal paralysis. Sometimes slight respiratory depression develops but lasts only a minute or so.

Pentothal-N_2O-O_2: relaxation with this technic is easily obtained with the lightest possible depth of anesthesia; for example, plane I has been found adequate for gastrectomies. The average lower laparotomy can often be carried through on 0.5 Gm. pentothal, although a really sthenic patient may require up to 0.9 Gm. Relaxation can be maintained with anesthesia so light that the patient is making slight movements. Deeper (plane II) anesthesia with a given dose of myanesin causes longer rather than more profound relaxation.

Pentothal-cyclopropane: plane I again is sufficient. Relaxation is often secured with slightly smaller doses of myanesin and often lasts much longer.

Pentothal-N_2O-O_2-ether: a few patients have received a small induction dose of pentothal (0.2-0.4 Gm.) and plane I has been maintained with N_2O-O_2 plus minimal ether (average 40 c.c. per hr.). The results are the same as with other anesthetics; the exceedingly small amount of ether used should be noted.

Patients who represented all kinds of risk including those incident to required emergency operative treatment have been accepted for administration of the drug. Those with poor kidney function and a number requiring prostatectomies were not excluded from this group. Their ages ranged from 3 to 86 years and the duration of operation from 15 min. to over 3-1/2 hours.

After major operations the patients given myanesin have been strikingly brighter and more comfortable than those receiving spinal or deep general anesthesia or curare to produce relaxation. Observations in one diabetic receiving insulin suggest that myanesin causes no upset of carbohydrate metabolism or postoperative acidosis. The incidence of vomiting has been low; only 12 per cent of the patients have vomited at all, and only 4 per cent more than twice. No patient has given rise to anxiety on the table through the use of myanesin, and none has died within at least five days of the operation.

(Not Restricted)

Summary. Myanesin, a new synthetic drug, appears to have well-marked advantages over curare.

It has a wider margin of safety than curare. Doses of from 5 to 20 c.c. (about 7-28 mg. per kg.) produce no undesirable effects; this is not unexpected since from 200 to 300 mg. per kg. is tolerated by animals.

Abdominal relaxation is obtainable even in the conscious patient; and without any distress.

The drug does not cause intercostal paralysis in doses producing full relaxation of the abdominal muscles.

In most cases it is much more effective with barbiturate anesthesia than is curare and apparently enhances the action of the barbiturates.

Abdominal relaxation is obtained so easily under pentothal-N_2O-O_2 when myanesin is used that the use of the more toxic agent cyclopropane is not necessary.

It is effective under the lightest possible anesthesia; this is of great importance in reducing the amount of general anesthetic needed.

No bronchospasm or salivation occurs even when no atropine or hyoscine has been given, and even in the conscious patient (Lancet, Jan. 18, '47)

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Curare in the Treatment of Poliomyelitis: The terms "spasm, spasticity or rigidity" as applied to the muscular tightness occurring in poliomyelitis have caused confusion. In the acute stage the muscle may be tender and stretching produces pain; in the subacute and chronic stages the muscle may be shortened but relatively free of pain and tenderness.

During the past four or five years emphasis has been placed on the treatment of the tightness resulting from poliomyelitis rather than on the paralysis. Previously, this tightness was not considered of great significance, was explained on the basis of meningeal irritation, and was considered transitory. Standard textbooks mentioned it but did not describe it in any detail. With the advent of the Kenny treatment and concept of poliomyelitis, tightness of the muscles was considered an important symptom of the disease.

Recent observations on poliomyelitis in human beings are in agreement on the following points: (1) spasticity of muscles is a reflex phenomenon

associated with an increase in the stretch reflex, and (2) tightness in acute poliomyelitis has a widespread occurrence in skeletal musculature, may be present in both flexor and extensor muscles, and may occur in partly weakened muscles or in muscles with normal strength.

In observations on human beings made at necropsy and in experimental studies, lesions of poliomyelitis are found in a number of centers in both the brain and spinal cord which are concerned with the function of muscles. As a result, there are several hypotheses concerning the pathologic site of origin of the symptom, muscular "spasm," but none of these precludes the possibility of a lesion in the muscles themselves. However, considerable evidence is being gathered to indicate that at least part of the spasticity has its origin in lesions in the brain stem.

In nearly all cases of poliomyelitis some tightness occurs in the neck and back but the amount that occurs varies greatly. Tightness may be minimal and disappear during the acute stage of the disease. Some patients may have only minimal stiffness of neck and back during the first few days of the disease and then rather extensive tightness develops with or without paralysis. Others may develop widespread tightness which persists for weeks with minimal weakness or extensive paralysis. The length of time this tightness persists is significant; and that it may be present for weeks and months with or without treatment is reasonably certain. It is generally conceded that it can be responsible for contractures and deformities, because it produces an imbalance of muscular function especially in the presence of weakness or paralysis. It is also true that tightness of the muscles of the back is nearly always present, may be asymmetrical, and if allowed to persist, may produce lateral curvatures of the spinal column without obvious weakness of the muscles.

The treatment of tightness by heat and drugs has been emphasized, perhaps unduly, although it should certainly not be minimized. There does not seem to be any definite proof that relief of tightness prevents paralysis, nor alters the mortality in the acute stages. Most patients become fairly limber after treatment with hot packs, warm baths, stretching, and active exercise has been carried out for from two to eight weeks. The time required for the tightness to disappear is unpredictable. It has become obvious that a patient who has considerable tightness will not respond to any form of heat or drug used alone. So far these agents have needed to be augmented by stretching and active exercise.

Among measures proposed for the relief of the tightness during the acute stage of poliomyelitis the use of curare was first advocated by Ransohoff. He has stated that he has been able materially to reduce the period of disability and to prevent deformities in a large series of cases by giving curare

(Not Restricted)

and by actively and passively stretching the affected muscles while the patient was under the influence of the drug. Fox, on the other hand, gave the drug to thirty-four patients and was unable to duplicate Ransohoff's results. Fox concluded his report by saying, "Curare in some instances may be of temporary benefit but it is a dangerous drug and is not to be encouraged for the treatment of the acute phase of poliomyelitis." It would appear that Fox gave only one injection of curare to each patient. This is much less than that recommended by Ransohoff and perhaps does not represent an adequate trial.

During the recent poliomyelitis epidemic the authors administered curare to eighteen patients (seven children and eleven adults). Four methods of administration were employed: intramuscular injection of curare alone and in oil and intravenous injection alone and with pentothal sodium. In addition to receiving curare, these patients were treated with hot packs and the physical therapy that was given in all cases of poliomyelitis.

The authors summarize this study by stating that the results indicate that treatment with curare does not materially affect any aspect of the clinical course of the disease. From the standpoint of shortening convalescence, curare did little or nothing more than that expected from the physical procedures. They have not observed any harmful effects from the stretching of tight muscles. In their experience curare has not proved to be a dangerous drug in the treatment of acute poliomyelitis; however, they stress the importance of having available the resources to deal with any possible untoward effects. (Proc. Staff Meet., Mayo Clin., Jan. 22, '47 - R. L. Richards et al.)

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Role of the Axis Cylinder in Transport of Tetanus Toxin: Through studies carried out in guinea pigs, P. G. Roofe, formerly of the Department of Anatomy of the University of Kansas, has concluded that the neurofibrillae in the axis cylinder are the structures responsible for the transport of tetanus toxin to the cell bodies of motor nerves. In this transport, the rate of progression in the guinea pig, assuming that the toxin travels at a uniform rate, is 3.35 mm. per hour. No attempt has been made to determine the mechanism by which the toxin ascends the nerve fiber.

The experiments which lead to these conclusions were carried out as follows:

(Not Restricted)

Eight guinea pigs were inoculated with a tetanus toxin of 75,000 m.l.d. per c.c. after their sciatic nerves had been carefully exposed and severed very close to the knee joint. In making the inoculation the central end of the sciatic nerve which had been cut was held firmly against the end of an applicator stick that had been dipped in the tetanus toxin of the above-mentioned strength. The time of exposure in each case was 5 minutes. The end of the applicator stick did not hold a drop of the toxin but was merely moist. All of the guinea pigs were dead within 72 hours. Their death was due to tetanus, the symptoms of which were those of the local type. The opposite limb was first to show signs of stiffness, then the lower back, thoracic level, and finally the cervical and head region. The wound was closed surgically under strict aseptic conditions.

In 8 other guinea pigs the sciatic nerve was exposed and frozen with CO_2 snow as far centrally as was conveniently possible. This technic produces the degeneration of the axis cylinder but does not alter the neurilemma sheath or the blood supply. The frozen area is about 2 mm. in length. Sixteen days later the same sciatic nerve in each animal was inoculated as described above. Two of the animals died on the fourth day of undetermined cause, showing no signs of tetanus. The other six were sacrificed on the sixth day after inoculation. The toxin failed to reach the central nervous system because of the degeneration of the axis cylinder.

In another series, 8 guinea pigs were inoculated in like manner without the freezing. Four of these received 0.5 c.c. of tetanus antitoxin subcutaneously 10 minutes previous to the inoculation. The other four were given 0.1 c.c. of the antitoxin into the sciatic nerve central to the cut end immediately after inoculation. All 8 of these animals, without any signs of tetanus, were sacrificed 14 days later. (Science, Feb. 14, '47)

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Final Report on the Clinical Testing of Antimalarial Drugs: This report is a final summary of malarial research conducted at Manteno State Hospital, Manteno, Illinois and the Illinois State Penitentiary, Stateville, Illinois, from 14 February 1944 to 1 August 1946. The report covers 48 pages and gives the testing set-up, chemical names of the compounds studied, compilation of results, etc. It is presented in two parts. The first part deals with the testing of potential antimalarial drugs in blood-induced vivax infections, using the American (McCoy) strain. Most of these studies were carried out at the Manteno State Hospital during the first nine months of the program. The second part of the report covers the testing of potential antimalarial agents in sporozoite-induced vivax malaria, using the Southwest Pacific (Chesson) strain.

(Not Restricted)

In addition to the evaluation of the antimalarial effectiveness of drugs, which constituted the primary aim of the research program, many observations and studies on the physiology, pharmacology and the toxicity of the new drugs were made. In the field of toxicity, the most extensive study was an evaluation of the chronic toxicity of chloroquine (SN-7618), the results from which are contained in Malaria Report No. 565.

Thirty-three drugs, including quinine, quinacrine, and pamaquin, were studied in sporozoite-induced infections. The following compounds are of special interest:

Suppressive. SN-7618. This drug, a 4-amino quinoline, which has been extensively studied in civilian and military installations, is a better suppressive agent than either quinine or quinacrine. Further exploration of the 4-amino quinoline group is indicated.

SN-11,437, a metanilamide, is of interest because it may prove effective in the suppression of vivax malaria by the administration of single weekly doses and because it represents a new type of antimalarial compound.

SN-10,275. This agent is closely related chemically to quinine. In contrast to quinine, it is excreted or degraded very slowly. Although SN-10,275 would be an impractical suppressive drug because of skin sensitization on exposure to sunlight, further exploration of chemically related compounds may lead to the discovery of one lacking this toxic manifestation.

Paludrine (SN-12,837). This drug represents a new chemical series that should be further explored.

Curative. The only group of compounds that has shown promise of preventive or curative activity is the 8-aminoquinoline group. Eleven of the twenty-two 8-aminoquinolines tested apparently cured at least one patient who presented a severe challenge to the drug. Five compounds (SN-13,274, SN-9,972, SN-13,276, CN-1,004, SN-13,429) other than pamaquin have cured more than one patient. The most effective compound studied to date is pentaquine (SN-13,276). CN-1,004 appears to be a compound of promise but has not been studied extensively enough for final evaluation. It is apparent, from the studies, that the best aliphatic side chain in the eight position is isopropylaminoamylamino. In the further exploration of 8-aminoquinolines and related lepidines, it would appear from a study of the relationships brought out in the testing, that expansion of observations should include 5,6-dimethoxy and 5-chloro, 6-methoxy nuclear substituents as well as terminal primary amines in the aliphatic side chain, because SN-9,972 has high curative activity and SN-13,694 and SN-12,352 have little or no toxicity.

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Summary. The best suppressive drug developed is chloroquine (SN-7618); and pentaquine (SN-13,276) is superior to pamaquin because it is curative and less toxic. Several other compounds offer enough promise to warrant the continuation of investigations. These compounds belong to the following chemical series: 4-amino quinolines, 8-amino quinolines, biguanidines, metanilamides and 2-piperidyl-4-quinolinemethanols. (OSRD Contract OEMcmr-450 - Malaria Rep. No. 723 of the Board for Coordination of Malarial Studies - A. S. Alving and L. Eichelberger)

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Status of Antibiotics for Use in Tuberculosis: The following material was obtained from papers presented at a recent meeting in Washington, D.C., of the Antibiotics Study Group of the National Institute of Health, U. S. Public Health Service.

Streptomycin

H. Corwin Hinshaw and William H. Feldman reviewed the work done at the Mayo Clinic:

The greatest potential use for streptomycin appears to exist in the treatment of tuberculosis. This is due to the great prevalence of tuberculosis, to the fact that no other practical and effective antibacterial therapy is available in tuberculosis, and to the fact that the Mycobacterium tuberculosis is much more sensitive to streptomycin than are other common pathogenic bacteria. Furthermore, the bacillus of tuberculosis remains sensitive to streptomycin for at least a few months before becoming drug resistant, and this frequently permits realization of satisfactory therapeutic results.

Many types of tuberculous infection unfortunately produce destructive pathologic changes which no drug can directly benefit. Antibacterial therapy is only suppressive and will yield permanent benefits only if natural mechanisms of healing can achieve supremacy during the limited period of a few months when the bacilli are sensitive to the action of streptomycin. Selection of patients with pulmonary tuberculosis for treatment with streptomycin must be undertaken with the greatest care. During the past two years these simple conclusions have been reached: (1) patients who are making satisfactory progress by means of conventional forms of treatment for pulmonary tuberculosis or who are likely to do so should not receive streptomycin; (2) patients with terminal types of pulmonary tuberculosis, especially when bilateral destructive changes are present, and patients who could not become candidates for surgery are not regarded as good subjects for treatment with streptomycin;

(3) patients with old, chronic, nonprogressive fibrocaseous and cavernous types of pulmonary tuberculosis are not likely to experience satisfactory results, and hence should not be treated; and (4) priority in treatment should be given to more acute, progressive pulmonary tuberculosis of recent origin.

The clinical results of treatment in the selected cases of pulmonary tuberculosis often are realized promptly. Within the first few weeks fever declines frequently, cough and expectoration may decrease, appetite and a sense of well-being may return, and the patient may begin to regain lost weight. Later, after from six to eight weeks of treatment, roentgenologic evidences of regression of exudative lesions are first noted. Usually within three to five months, maximal clinical and roentgenologic improvement has been attained. This would appear to be the time for the surgical treatment of remaining disease, and especially for closure of any remaining cavities such as might serve as sources for subsequent bronchiogenic dissemination of the disease.

Ulcerating tuberculous lesions of the larynx, hypopharynx and the tracheobronchial tree usually have healed very rapidly, and thus far without exception rapid healing has occurred in the small series of ten cases at the Mayo Clinic. These patients have received combined treatment with streptomycin, administered intramuscularly and by aerosol.

Some types of extrapulmonary tuberculosis have responded to treatment with streptomycin with promptness and uniformity. This is especially true of chronic, long-standing, draining sinus tracts, which usually close within a few weeks, but these will remain closed only if treatment is continued for several weeks after superficial healing. In renal tuberculosis and tuberculous cystitis, temporary and palliative effects have been observed frequently, but actual healing of renal lesions has been observed rarely, possibly because the kidney lacks the power to heal tuberculosis readily.

Only a few patients with tuberculosis of bones and joints have been treated, but results have been encouraging. Much remains to be learned about streptomycin in relation to orthopedic surgery in tuberculosis of the skeletal system.

Until the advent of streptomycin there was no way in which the course of tuberculous meningitis and miliary tuberculosis could be modified. Even with streptomycin treatment, there has so far been an extremely high fatality rate among treated patients. However, some patients who have early tuberculous meningitis respond promptly to the adequate intramuscular and intrathecal administration of streptomycin, but all too frequently these gains are not permanently sustained. At least temporary clinical remission is frequently realized after streptomycin treatment of early, but acute and severe, tuberculous

meningitis. Consciousness may be regained, sometimes within a few days, fever may decline within a few weeks, a sense of well-being may return, and frequently patients appear to be essentially normal and may remain so for several months. Subsequent exacerbations of the disease are likely to occur, and are not likely to respond to treatment. However, this may not always be the case, for the Mayo doctors have treated three patients with proved tuberculous meningitis and have obtained arrest of the disease which continued for several months after discontinuation of a six-month course of intensive treatment. One patient had no residual neurologic signs, one is normal except for deafness, and the third apparently has suffered severe tuberculous damage to the central nervous system, especially the cerebellum. Although nearly a year has passed since the onset of illness in these three patients, these workers believe that it is too early to classify them as cured. Five patients with tuberculous meningitis have died despite treatment, but three of these did not receive what is now regarded as adequate treatment, and the remaining two were first seen in a late stage of the disease.

Disseminated hematogenous tuberculosis of the miliary type has not responded previously to any form of treatment, and spontaneous recoveries have been extremely rare. With streptomycin treatment it is possible to bring about a complete clinical and roentgenologic remission in some treated patients, but, unfortunately, the rate of recurrence has been very high thus far, and three of the four patients treated eventually died. The remaining patient has remained well for more than six months, but cannot yet be classified as cured.

Tuberculosis of the alimentary tract and tuberculous peritonitis have not been studied adequately, but symptomatic improvement has been very striking in the five patients who have been treated at the Mayo Clinic.

Although the clinical effectiveness of streptomycin is readily demonstrated in many types of tuberculous infections, the results often are not permanent and frequently do not compare with results achieved in acute diseases treated with other antibacterial agents (such as penicillin). The limitations of streptomycin treatment in tuberculosis must be emphasized constantly in this day of "miracle drugs," and full consideration must be given to the toxic potentialities of the drug. The most uncomfortable and possibly serious toxic effects which the Mayo doctors noted have been those attributed to impaired function of the eighth cranial nerve. Emphasis must still be placed on the known effective methods of treating tuberculosis, especially sanatorium care and collapse therapy. The place of streptomycin in tuberculosis therapy has not been fully determined, but it does appear to have a very great usefulness which is much more likely to supplement than to supplant the proved effective standard methods of treatment.

(Not Restricted)

Paul A. Bunn, Associate to the Chief, Tuberculosis Division, U.S. Veterans Administration, reported upon the studies made in the treatment of patients under the care of the Veterans Administration:

The VA has undertaken a large-scale investigation of the clinical and toxicologic effects of streptomycin in the treatment of tuberculosis, using a uniform protocol. To be included in the series, all patients had to exhibit positive pathological or bacteriological proof of tuberculosis before streptomycin was administered.

The results obtained by the seven study units in VA hospitals seems sufficiently definite and advanced to warrant a preliminary report at this time. It should be emphasized that these results are only the immediate results of treatment and that considerable time must elapse before any conclusions can be drawn as to their permanence. Because the results are impressive, the VA is continuing the investigation and has enlarged it to include 19 study units.

Ninety-one patients with pulmonary tuberculosis were treated for from 100 to 120 days with a daily dosage of 1.8 grams. These general remarks may be made from this series: (a) no patient under therapy has become worse, nor has a new lesion appeared; (b) the most marked beneficial effect is on the exudative lesions; and (c) no patient has been completely cured.

There is no data on whether larger amounts administered for a longer period of time would have produced greater improvement; nor is it known whether smaller amounts administered for a shorter time would have produced similar improvement.

Twelve patients with tuberculous tracheobronchitis have shown complete healing of definite ulcerations when streptomycin was used both intramuscularly and by aerosol at a total daily dosage of 2.9 Gm. for periods of 60 days and, occasionally, for much shorter periods of time. Laryngeal and pharyngeal ulcerations have responded less favorably when treated by the aerosol route alone.

With a total of 60 tuberculous sinuses in 12 patients, complete healing in practically all those sinuses occurred after 60 to 90 days at a daily dosage of 1.8 Gm. of streptomycin.

Fifty patients with miliary tuberculosis and tuberculous meningitis were treated, with a definite reduction of the anticipated mortality rate.

It seems clear that streptomycin is capable of healing certain tuberculous lesions and of serving as an adjunct to existing forms of therapy in

other types of tuberculosis. It is sufficiently toxic so that its use must be accompanied by careful clinical observation and laboratory studies. The precise indications for its use and the optimal dosage regimen remains to be determined

Eumycin

Kenneth L. Burdon and Edwin A. Johnson, Baylor University College of Medicine, Houston, Texas, reported on eumycin:

Eumycin, an antibiotic, derived from cultures of Bacillus subtilis, Marburg, exerts a marked inhibitory effect upon the growth of several important filamentous fungi, diphtheria bacilli, and acid-fast bacilli. The original material, which was toxic and therefore administered in small dosage, exhibited a definitely suppressive effect on virulent human strains of Mycobacterium tuberculosis in mice. Hemolysis was apparently the most troublesome toxic effect; on the other hand, action against acid-fast bacilli does not appear to be associated inevitably with the production of hemolysis. Obviously, much remains to be done with eumycin. For example, in nearly all of the reported studies these workers have used a single one of the 22 strains of B. subtilis that they originally isolated. A more intensive investigation of this and of other phases of the problem is now being organized.

Nocardine

E. W. Emmart, Division of Physiology, National Institute of Health, Bethesda, Maryland, reported on nocardine:

A mold belonging to the family Actinomycetaceae has been isolated and classified as Nocardia coeliaca. The mold grows under conditions established for the culture of the bacilli of tuberculosis and produces a tuberculostatic substance in the culture medium. The crude filtrate containing "nocardine" in concentrations as low as 0.5 unit per c.c. was found to inhibit the growth of certain slow growing virulent human and bovine strains, but this concentration was ineffective in inhibiting certain rapidly growing strains. In vivo tests on the chorio-allantoic membranes of the chick embryo show that suspensions of bacilli of the A 27 strain incubated 24 hours with the crude Nocardia filtrate produced fewer tubercles per membrane than control suspensions. When guinea pigs were inoculated with part of the same suspensions, the weights of the animals indicated that the infection was of a more chronic type in the experimental group than in the control group. Better methods of recovery and purification of the active substance, nocardine, are necessary before a sufficient quantity is available to treat infected animals and to compare its chemotherapeutic efficacy with other antibiotics.

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Abstracts of Reports on Research Projects:

X-133
Rep. No. 3
16 Dec. '46

Further Study in the Use of Tantalum in Cranioplasty.

The purpose of this investigation was to study the regeneration of the margin of the skull around a tantalum implant under conditions simulating those incurred in the open craniocerebral wounds of warfare.

Tantalum plates were inlayed into large midline skull defects of seven monkeys. On one side of the midline the brain was wounded with electrocautery and suction, and the overlying dura resected. On the other side the dura and brain were not disturbed. The animals were observed for periods of time varying from 32 to 597 days.

Rather extensive bony regeneration was observed both superficial and deep to the inset plate, indicating that dural and pericranial osteogenesis had taken place. It was not possible to decide, however, which of these two types of activity is normally the more important. Where cerebral injuries had been made and the dura over them destroyed, there was displacement of the sagittal sinus and falx toward the opposite hemisphere. This apparently was due to edema of the brain in the absence of the restraining effect of the normal overlying dura.

As a result of the observations made in this study, it is suggested that (a) the dura be closed in the primary treatment of open craniocerebral wounds and (b) tantalum plates be inlayed, rather than onlayed, in the repair of skull defects. (Nav. Med. Res. Inst., NNMC, Bethesda, Md. - R. H. Pudenz and C. H. Sheldon)

X-205
Rep. No. 7
26 Nov. '46

Critical Factors in Minimal Air-Cooling of Living Quarters.

The present study was undertaken to investigate the factors involved in marking the upper limits of temperature and humidity for the minimal air-cooling of living quarters.

A group of 12 youths, previously acclimatized to a more severe heat, were maintained continuously for periods of up to four and one-half days at each of a series of humidities in the dry bulb temperature range of from 76° to 93° Fahrenheit which is equivalent to an effective temperature (ET) range of from 73° to 83° F.

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X-205 (Cont.) The values for rectal temperatures, pulse rates, per cent "tired," per cent "drowsy," per cent who "did not sleep well," and mean number of times the subjects remembered awaking during the night, were considered satisfactory and showed no critical changes in the temperature range studied.

For the regimen employed, the threshold for producing heat rash seemed to lie between 82° and 84° F. at high humidity (70-80%) and between 87° and 89° F. dry bulb at low humidity (30-40%). If the effective temperature did not exceed 78° and the dry bulb temperature did not exceed 85°, men were comfortable, slept well, did not develop heat rash, and were not under excessive physiological strain. (Nav. Med. Res. Inst., NNMC, Bethesda, Md. - R. H. Kellogg)

X-573 Rep. No. 2, Sept. '46 The Hand and Digit Prosthesis.

The object of this study was to develop (a) an esthetically acceptable hand prosthesis to be constructed of a suitable material to simulate closely a normal hand, (b) an improved material that may be used to replace missing digits, and (c) a light weight mechanism to activate the new hand prosthesis.

Work on this project was started at the Naval Dental School in 1944. Extensive research along with the development of new materials have resulted in improved prosthetic restorations for the hand and digit.

Three mechanical devices to activate a cosmetic hand have been devised and put to use. Two designs have been discarded and a third is undergoing further modification.

The flexible covering material, Flexi-Derm, now in use at the U.S. Naval Dental School, is the most satisfactory resin that has been developed to date. With the use of this material, improved partial hand restorations have been made available to approximately forty veterans of World War II.

Specifications of an adequate covering material for the artificial hand should include (a) abrasive resistance, (b) flexibility, (c) crystal clearness of color and (d) durability.

(Not Restricted)

X-573 (Cont.)

Flexi-Derm and other resins should be processed in a metal mold if optimal qualities are to be obtained.

It is proposed that metal molds be made from the near perfect replicas of human hands which have been reproduced in two high heat flexible resins.

An intensive program has been under way for some time for the development of an electro-formed mold, and a new method utilizing a casting technic is now being worked out. (U. S. Nav. Dental School, Bethesda, Md. - H. J. Towle, Jr.)

X-728 (Bio. 58) 23 Oct. '46

Development of Combined Poncho-Litter.

The object of this study was to modify the cloth-poncho (Stock No. 72-P-916) without impairing its efficiency as such but at the same time making possible its use as a front-line litter.

With this in view a combination poncho-litter was devised by modifying the present cloth poncho. Supports and handles have been added to the poncho which permit with reasonable comfort to the patient its use as a front-line litter for a two, four, or six-man carry, without impairing its efficiency as a poncho or shelter-half. As modified, half of the poncho may be used as a blanket-like cover for aid in surgical-shock prevention and for use in protecting the patient from the elements. This modification increases the poncho weight by not more than five ounces. (Med. Field Res. Lab., Camp Lejeune, N.C. - H. J. Spangler)

X-630 Rep. No. 9 23 Dec. '46

A Wire Resistance Strain Gage for Measuring Physiological Pressure Phenomena.

Large beam-type wire resistance strain gage devices were used during the early investigations on the impact decelerator to estimate the impact pressure distribution on the thorax and abdomen by the regulation shoulder straps and seat belt. This type of gage operated satisfactorily but the entire instrument was found to be too large, bulky, and uncomfortable for efficient pressure determinations as the maximal tolerable limit of the subject was approached. Consequently, smaller instruments were developed progressively until a diminutive workable design was determined. After

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X-630 (Cont.)

appropriate calibration this instrument may be used to measure many other physiological phenomena which can cause pressure changes on the sensitive diaphragm surface. (Nav. Med. Res. Inst., NNMC, Bethesda, Md. - H. R. Bierman and H. K. Hellems)

X-279 Rep. No. 3 30 Dec. '46

Foot Dimensions of 1500 Naval Recruits in Relation to Shoe Design.

Foot ailments contribute substantially to loss of time and inefficiency among naval personnel. Reports from various training stations have indicated that shoes fitted in length and width by the usually accepted methods still may cause foot trouble. It is known that there are numerous foot types which cannot be fitted by a single shoe design.

There appear to be certain factors in the last now being used which, because the shoes do not fit the general contours of many feet, cause heel blisters, ingrowing toe nails, persistent corns on the fourth and fifth toes, bursitis over the head of the fifth metatarsal bone and callous ridges on the outer side of the sole of the foot.

This present study was undertaken to determine the characteristics of the weight-bearing foot in order to improve further the design of the navy oxford.

Eight measurements of the right foot of 1500 male navy recruits were made, utilizing in part, sole tracings.

These measurements and the sole patterns differ in some respects from the design of the present navy oxford and suggest the reasons for some of the present foot dysfunction.

Trial shoes have been constructed based upon the measurements obtained and differ from the present navy oxford in the following respects:

a. The heel seat is larger.
b. The heel-to-ball length is greater.
c. The insole is straight instead of being inflare.

(Not Restricted)

X-279 (Cont.) Certain construction features also have been changed to increase the wearing qualities of the shoe:

a. A longer metal shank was inserted and anchored in the center of the heel.
b. A non-deforming filler (sheet cork) was used.
c. The last bottom was made flatter.

(Nav. Med. Res. Inst., NNMC, Bethesda, Md. - O. N. Schuster)

X-756 Rep. No. 2 17 Dec. '46 The Role of Clostridium Perfringens in Human Food Poisoning.

Toxic filtrates and living broth cultures of strains of Clostridium perfringens incriminated in food poisoning outbreaks and additional strains from the American Type Culture Collection were tested in man and animals by oral administration.

The results show that Cl. perfringens produces an enterotoxin capable of eliciting varying symptoms of acute food poisoning in man and young cats. These were of moderately short duration and indications of individual variations in the degree of susceptibility were observed.

On the basis of studies to determine the physiological action of the enterotoxin, it was hypothesized that the enterotoxin acts on peripheral sensory structures of the viscera, the impulses passing through the vagus nerves to the vomiting center.

The enterotoxin was found to be heat stable, dializable, and not readily affected by changes in pH. (Nav. Med. Res. Inst., NNMC, Bethesda, Md. - L. Cravitz and J. D. Gillmore)

NOTE: Those interested in seeing copies of the complete reports should address their request to the Research Division, BuMed.

Opinions or conclusions contained in these reports are those of the authors. They are not to be construed as necessarily reflecting the views or the endorsement of the Navy Department. Reference may be made to those reports marked "Not Restricted" in the same way as to published articles noting authors, title, source, date, project number, and report number. No part of the content of RESTRICTED reports may be published, reproduced, or referred to in articles for publication without permission obtained through the Bureau of Medicine and Surgery.

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List of Dental Material: Dental activities have experienced difficulty in identifying certain items that are frequently used in dentistry, but which are listed in other than Class 5 of the Bureau of Medicine and Surgery Section of the Catalog of Navy Material. The following list is published for the purpose of assisting dental officers to identify and requisition items of this type that are required for use in dental departments.

STOCK NO.	ITEM	UNIT
1-008-711	Cylinder, acetylene, empty	Ea.
1-008-712	Acetylene, 40 cu ft.	Cyl
1-009-985	Acetylsalicylic acid tablets, 5 grs. 100's	Bot.
1-048-010	Alcohol, 1/2 gal.: USP, ethyl	Can
1-054-750	Alkaline, Aromatic Sol. Tab. 100's	Bot.
1-060-875	Ammonia Inhalant, Aromatic, Amp. 1/3cc, 10's	Pkg.
1-061-075	Ammonia Spirit, Aromatic, 2cc, 4's	Pkg.
1-069-000	Amyl Nitrite Ampuls, 1/3cc (5minums) 12's	Pkg.
1-069-745	Anesthetic Oint., Post Op., 3/4 oz.	Tube
1-082-000	Asbestos, 1/4 lb.: USP (powder)	Bot.
1-127-000	Carbon Tetrachloride, 1/4 lb. NF	Bot.
1-133-000	Chalk, Prepared 1 lb.: USP	Bot.
1-139-000	Chloroform (not for anesthesia) 1 lb.: USP	Bot.
1-148-985	Codeine Sulfate tabs., 1/2 gr. 100's	Bot.
1-150-000	Collodion, flexible 1 oz.: USP	Bot.
1-175-330	Epinepherine Hydrochloride Sol., 1:1000, 1 oz.	Bot.
1-184-000	Eugenol,1 oz.: USP	Bot.
1-190-000	Ferric Chloride, 1/4 lb.	Bot.
1-204-895	Formaldehyde, Cresolated, 1 oz.	Bot.
1-228-460	Hydrochloric Acid, 1 lb.	Bot.
1-229-000	Hydrogen Peroxide, Sol., 1 pt.: USP 3%	Bot
1-235-125	Iodine Tincture, 2 oz.: USP	Bot.
1-235-185	Iodine and Zinc Iodide Glycerite, 1 oz.	Tube
1-245-200	Jelly, Lubricating, 4 oz.	Bot.
1-283-005	Mercury, 1 lb.: USP	Bot.
1-285-705	Merthiolate Tincture: NNR, 1:1000, 1 pt.	Tube
1-295-000	Morphine Sulfate Tabs., 1/8 gr. hypo., 20's	Bot.
1-330-770	Pentobarbital Sodium Caps., 1½gr; USP, 500's	Can
1-336-000	Petrolatum, Liquid, 1 qt.: USP (heavy)	Can
1-338-025	Petrolatum, white, 1 lb.: USP	Bot.
1-339-920	Phenol, 1 lb.: USP	Bot.
1-372-000	Potassium Permanganate, 1 lb.: USP	Bot.
1-384-005	Procaine Hydrochl, Epinephrine, Tabs, 100's	Box
1-405-010	Silver Nitrate Sol., Ammoniacal, Amp. 2cc 6's	Jar
1-412-000	Soap, Soft, 1 lb.	Can
1-415-000	Sodium Bicarbonate, 1 lb.: USP	Bot.
1-419-000	Sodium Borate, 1 lb.: USP	Bot.
1-428-995	Sodium Chloride, 1/4 lb.: ACS	Bot.
1-439-300	Sodium Perborate, 1/4 lb.: USP	Bot.
1-462-200	Sulfadiazine Tablets, 1/2gm. (7½gr.) 1000s: USP	Bot.
1-463-700	Sulfanilamide Tablets, 0.324Gm. (5gr.) 1000s	Bot.
1-464-100	Sulfathiazole Tablets, 0.5 Gm. (7½gr.) 1000s	Bot.

STOCK NO.	ITEM	UNIT
1-467-515	Sulfuric Acid, 1 lb.:ACS	Bot.
1-473-000	Thymol, 1 oz.:USP	Bot.
1-474-000	Thymol Iodide, 1 oz.:USP	Bot.
1-488-575	Tragacanth, 1 lb.:USP;Powder	Bot.
1-498-705	Zephiran Chloride, Sol.,concentrate, 10%, 4 oz.	Bot.
1-500-625	Zinc Chloride, 1/4 lb.:USP	Bot.
1-501-000	Zinc Oxide, 1 lb.:USP	Bot.
2-037-205	Plaster of Paris, Modeling,5lb.:For field use	Can
2-037-235	Plaster of Paris, Modeling, 35 lb.	Pail
2-038-420	Sponge, Surgical, 2" x 2", 200s: For field use	Pkg.
3-038-100	Applicator, Wood, 6¼" long, 864s:	Pkg.
3-244-200	Depressor, Tongue, Metal, Weder: Small	Ea.
3-245-500	Depressor, Tongue, Wood, 100s	Box
3-345-600	Forceps, Hemostatic, Mosquito, 5"	Ea.
3-375-400	Forceps, Sterilizer, 7"	Ea.
3-393-200	Gag, Mouth, Denhardt; Lined jaws	Ea.
3-393-700	Gag, Mouth, Screw Type; Adjustable	Ea.
3-397-860	Gloves, Surgeons, Size 7½	Pr.
3-397-880	Gloves, Surgeons, Size 8	Pr.
3-417-200	Holder, Needle, Collier, 5"	Ea.
3-419-100	Holder, Needle, Hegar-Mayo, 6"	Ea.
3-447-100	Blade, Operating Knife, #10, 6s	Pkg.
3-447-120	Blade, Operating Knife, #11, 6s	Pkg.
3-447-140	Blade, Operating Knife, #12, 6s	Pkg.
3-447-200	Blade, Operating Knife, #15, 6s	Pkg.
3-447-800	Handle, Operating Knife, #3;For blades #10,11,12,15	Ea.
3-512-780	Needle, Suture, Eye, ½ Circle, Size 4, 6s	Pkg.
3-651-820	Scissors, Operating, Straight,One Point Sharpe,5½"	Ea.
3-760-400	Suture, Dermal, 000, 12s: Needle affixed	Pkg.
3-762-200	Suture, Nylon, Braided, 00000, 25 yds: Black	Spool
4-097-000	Bulb, Rubber, 3ml., 12s: For medicine dropper	Pkg.
4-182-000	Clock, Interval Timer: Alarm Clock type	Ea.
4-228-120	Dropper, Medicine, 12s: With rubber bulb	Pkg.
6-008-075	Cassette, 5" x 7"	Ea.
6-012-120	Chest, X-ray, Film, Lead Lined, Approx.9"x22"x18"	Ea.
6-015-005	Film, X-ray, 1-1/4"x1-5/8", 144s, Domestic Packing	Pkg.
6-015-010	Film, X-ray, 1½"x 1-5/8", Export Packing 144s	Pkg.
6-015-050	Film, X-ray, 2¼"x3", Domestic Packing, 12s	Pkg.
6-015-070	Film, X-ray, 2¼"x 3", Export Packing, 12s	Pkg
6-016-075	Film, X-ray, 5"x 7", Domestic Packing, 12s	Pkg.
6-031-755	Hanger, Film Processing, 5" x 7"	Ea.
6-031-795	Hanger, Dental Film Processing: 14 Films	Ea.
6-032-425	Holder, Bitewing Adapter, Set of 2	Set
6-034-300	Holder, Film, Exposure, Dental, 10s: Wood	Pkg.

STOCK NO.	ITEM	UNIT
6-039-525	Illuminator, Dental Film, 110-220V,AC-DC:Magnifying	Ea.
6-039-545	Glass, Dental Film Illuminator, Opal:Replacement	Ea.
6-110-000	Mount, Dental Film, 14 Film, 12s	Pkg.
6-121-750	Powder, Developing, X-ray, ½ Gal.	Pkg.
6-121-775	Powder, Developing, X-ray, 1 Gal.	Pkg.
6-121-875	Powder, Fixing, X-ray, ½ Gal.	Pkg.
6-121-880	Powder, Fixing, X-ray, 1 Gal.	Pkg.
6-124-920	Radiographic Unit, Dental Wall Mounting, 110v, 60Cy., AC	Ea.
6-124-925	Cone, Bakelite, For Weber Dental X-ray Unit	Ea.
6-124-930	Cone, Positioning, For G.E. Model "E" CDX X-ray Unit	Ea.
6-124-940	Meter, Ammeter, Type CT: For G.E. Model "E" X-ray Unit	Ea.
6-124-945	Meter, MA and KV, For Weber Model Raydex X-ray Unit	Ea.
6-124-950	Meter, Volt, Type CU For G.E. Model "E" X-ray Unit	Ea.
6-124-975	Timer, X-ray Exposure, For G.E. Model "E" X-ray Unit	Ea.
6-124-980	Timer, X-ray Exposure for Weber Model Raydex X-ray Unit	Ea.
6-127-650	Safe, X-ray Film, Dental	Ea.
6-127-775	Safelight, Bench Or Wall, X-ray Filter	Ea.
6-167-250	Tank, Developing, Dental Film, Refrigerated: 1 Gal. Capacity	Ea.
6-167-400	Tank, Developing, Radiographic, Refrigerated: 5 Gal.Capacity	Ea.
6-167-900	Thermometer, Film Processing: Floating Tank Type	Ea.
6-289-00	Ventilator, Exhaust, 110V, 60Cy, AC: Light Proof	Ea.
6-289-300	Ventilator, Intake, 18" x 24": Light Proof	Ea.
7-026-840	Cabinet, Instrument, 30" x 16"x 72"; one door; 6 glass shelves	Ea.
7-081-590	Stand, Instrument, Adjustable; Tray 14" x 18"	Ea.
7-084-525	Sterilizer, Instrument, 110V, AC-DC 13"x 5" x 3-3/4"	Ea.
7-150-425	Apron, Cotton, White	Ea.
7-172-325	Smock, Gray: For Dental Technician	Ea.
7-172-360	Smock, White: For Dental Officer	Ea.
7-178-075	Towel, Hand, Dental, Gray	Ea.
7-706-425	Bag, Hot Water or Ice, Combination: Rubber	Ea.
7-707-500	Bag, Ice, Throat	Ea.
7-709-220	Basin, Pus	Ea.
7-725-925	Brush, Hand	Ea.
7-754-700	Clock, Nurse, With second hand	Ea.
7-819-000	Hone, Oil, Arkansas Stone, 2" x 8"	Ea.
7-820-005	Hot Plate, 1 Burner, 110V, AC-DC	Ea.
7-820-505	Hot Plate, 2 Burner, 110-V, AC-DC	Ea.
7-827-075	Jar, Dressing, With Lid	Ea.
7-828-000	Jar, Suture, Glass; with lid	Ea.
7-829-510	Knife, Pocket: Jackknife	Ea.
7-863-512	Oil, Lubricating, 3 oz., For dental engines	Tin
7-896-975	Shears, 6"	Ea.
7-932-000	Thermometer, Clinical, Oral, Fahrenheit Scale	Ea.
7-939-945	Tray, Instrument, 2" x 8-1/2" x 10"	Ea.
7-940-000	Tray, Instrument, 2"x 9" x 15"	Ea.
7-973-900	Lamp, Incandescent, 5V, For Diag. Lamp, Rit.C&D Units	Ea.
7-973-920	Lamp, Incandescent, 5V, For Diag. Lamp, Rit. E. Units	Ea.

(Not Restricted)

STOCK NO.	ITEM	UNIT
7-973-940	Lamp, Incandescent, 5V, For Diag. Lamp, SSW. Units	Ea.
7-979-100	Lamp, Incandescent, 115V, 40W, For Dental Film View Box	Ea.
7-979-550	Lamp, Incandescent, 115V, 100W, For Dental Oper. Lamp.	Ea.
10-100-032	Accepted Dental Remedies	
10-100-050	Atlas of the Mouth	
10-100-230	Complete Dentures	
10-100-330	Dental Roentgenology	
10-100-350	Dental Treatment of Maxillofacial Injuries	
10-100-430	Dictionary of Dental Science & Art	
10-100-450	Diseases of the Mouth & Their Treatment	
10-103-350	Facial Prosthesis	
10-109-480	Histopathology of Teeth & Surrounding Structures	
10-129-850	Operative Dentistry	
10-130-050	Operative Oral Surgery	
10-130-070	Oral Pathology	
10-130-130	Partial Denture Construction	
10-130-150	Periodontia	
10-132-750	Practical Anesthesia for Dental & Oral Surgery	
10-150-030	Theory & Practice of Crown & Bridge Prosthesis	
10-150-530	Traumatic Injury of the Facial Bones	
10-155-591	American Illustrated Medical Dictionary	
10-155-610	Anatomy of the Human Body	
10-167-600	Manual of the Medical Department, U. S. Navy	
10-198-850	Webster's New International Dictionary	
10-700-330	Clinical Anesthesia	
10-750-550	Standard Practice of Plastic and Maxillofacial Surgery	
10-750-670	Surgical Diseases of the Mouth and Jaws	

STOCK NO.	NAVMED	ITEM	UNIT
14-112-200	H-4	Health Record, Dental Record, Set of 2	Set
14-119-900	K	Report of Dental Operations & Treatments, 25s	Pad
14-120-000	L	Report of Prosthetic Dental Treatment, 25s	Pad
14-130-000	W	Medical Stores Ledger Sheet, 100s	Pad
14-266-600	HF-57	Special Examination & Treatment, Request 100s	Pad
14-295-500	351	Statistical Reporting & Diagnostic, Nomenclature	Ea.
14-301-100	461	Quarterly Dental Report-Personnel, 20s	Pad
14-304-400	566	Appointment Book	Ea.
14-313-300	610	Prosthodontia Report, Monthly, 50s	Pad
14-324-400	785	Semi-annual Dental Officer Personnel Report	Sheet
14-334-400	937	BuMed Circular Letters: Bulletin	Set
14-336-600	952	Prosthetic Laboratory Card	Ea.
14-344-400		Binder, Stock & Equipment Ledger	Ea.

(Dental Div., BuMed)

(Not Restricted)

Attention Naval Reserve Officers:

Opportunity for Active Duty. The attention of Reserve medical officers and of pharmacists is invited to the opportunity to return to active duty at (1) one of the major naval air stations of the Naval Air Reserve Training Command or at (2) one of the Naval Air Reserve Training Units (NARTUs), each as listed below:

Major Naval Air Stations of the Naval Air Reserve Training Command	Naval Air Reserve Training Units based at
NAS, Atlanta, Ga.	NAS, Anacostia, D.C.
NAS, Columbus, Ohio	NAS, Jacksonville, Fla.
NAS, Dallas, Texas	NAS, Miami, Fla.
NAS, Glenview, Ill.	NAS, Norfolk, Va.
NAS, Grosse Ile, Mich.	NAS, Seattle, Wash.
NAS, Los Alamitos, Calif.	
NAS, Memphis, Tenn.	
NAS, Minneapolis, Minn.	
NAS, New Orleans, La.	
NAS, New York, N.Y.	
NAS, Oakland, Calif.	
NAS, Olathe, Kas.	
NAS, Squantum, Mass.	
NAS, St. Louis, Mo.	
NAS, Willow Grove, Pa.	
NAS, Denver, Colo.	

Reserve medical officers and pharmacists who are interested in active duty at one of the stations or units listed above should initiate letters to the Bureau of Naval Personnel, via the Chief of Naval Air Reserve Training, Naval Air Station, Glenview, Ill., and BuMed, listing three or four stations at which duty is desired in order of preference. Personnel are desired in ranks not above that of commander in the Medical Corps.

Officers qualifying for the above billets are advised that, consistent with the needs of the Service, every effort will be made to continue them in their assignments. Certain of the above billets carry orders to duty involving flying for designated naval flight surgeons. Government quarters are available at many of the major naval air stations. (Personnel Div., BuMed)

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(Not Restricted)

Reserve Medical Officers Needed for Combat Air Group Training Course: Reserve Medical Officers will be needed for a two weeks' training course of Navy and Marine combat air groups of the Naval and Marine Air Reserve Training Commands. It is anticipated that the first of these periods will occur in the month of June, 1947. Interested officers below the rank of Captain are invited to communicate with the Staff Medical Officer of CNAResTra, NAS, Glenview, Ill., stating geographic area where duty is desired, and the date which will be most convenient to attend. (Personnel Div., BuMed)

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(Not Restricted)

Regulations Revised for Appointment of Acting Assistant Surgeons (Naval Interns): By recent directive of the Secretary of the Navy, the professional examination has been suspended as a part of the procurement processing of candidates for appointment to naval internship in the grade of Acting Assistant Surgeon with the rank and pay of a junior grade lieutenant. The qualifications of applicants shall henceforth be determined on the basis of physical examination, personal interview, and a review of the credentials that make up their officially compiled record.

In the past, it has been necessary for candidates for appointment to naval internship to appear before Boards of Medical Examiners and Supervisory Examining Boards at the naval hospital nearest their school or place of residence and to remain in attendance before these boards for a period of five days to complete a prescribed schedule of physical and professional examinations. Hereafter, all phases of procurement processing including physical examination, interview, and compilation of credentials (in lieu of professional examination), will be accomplished by the offices and branch offices of Naval Officer Procurement. Candidates may, therefore, undergo procurement processing by presenting themselves at the Office of Naval Officer Procurement (or branch office) nearest their school or place of residence.

The physical and professional qualifications of candidates will be finally determined by a board convened in the Navy Department from a review of reports and credentials submitted by the offices of Naval Officer Procurement. Following completion of proceedings of this board, qualified candidates will be notified of their selection by formal letter from the Bureau of Naval Personnel. Appointments in the grade of Acting Assistant Surgeon and orders to active duty for intern training in a U.S. naval hospital will be issued to selected candidates through an office of Naval Officer Procurement upon receipt in the Department of a certificate from the dean or registrar of their medical school to the effect that they have satisfactorily completed their medical school education.

(Not Restricted)

It is pointed out that this suspension of professional examinations as a part of the qualification procedure for appointment to naval internship in no way lessens the standards prescribed for candidates seeking appointment as Acting Assistant Surgeon in the U.S. Navy nor does it in any manner affect the professional examinations required of candidates for appointment in the grade of Assistant Surgeon following completion of internship.

The provision that candidates must have completed the third year of medical school to establish eligibility to apply for appointment as Acting Assistant Surgeon remains fully in effect under this revised procedure.

The intern training conducted in the U.S. naval hospitals is rotating in character, of twelve months' duration, and bears the full approval of the Council on Medical Education and Hospitals of the American Medical Association. (C. A. Swanson, Surgeon General)

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(Not Restricted)

Publication Board Scientific and Industrial Reports: The 28 February 1947 issue (Vol. 12, No. 7-B) of the Current List of Medical Literature published by the U.S. Army Medical Library contains a 30-page list and 15-page index of original reports on research pertaining to medicine received in the library up to 1 February 1947 for photoduplication servicing, from the Office of the Production Board, now the Office of Technical Services of the U.S. Department of Commerce. These reports were previously withheld from general distribution for military reasons. Complete lists of these reports are contained in the Bibliography of Scientific and Industrial Reports published weekly by the Department of Commerce. The Army Library's list will be brought up to date from time to time in subsequent issues of their weekly Current List of Medical Literature as additional reports are received. The reports will not be loaned but may be ordered on microfilm or in photostat at the prices stated for each report as shown in the list. Copies of the 28 February 1947 Current List of Medical Literature may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 10 cents each.

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Circular Letter 47-13 11 February 1947 (Not Restricted)

To: All Ships and Stations

Subj: Policy Regarding the Disposition of Enlisted Personnel Not Physically Qualified for Full Duty.

Refs: (a) BuPers-BuMed Joint Ltr of 7 Oct 1946, Pers-66-SRJ P3-5 BuMed-3322-RAB-imb, P2-5, C/L 46-149. (Not to all and not needed.)
(b) BuPers ltr Pers-630-DW-3 of 17 Aug 1943.
(c) BuPers-BuMed Joint Ltr of 30 Mar 1944, 44-405, pg 741, Jan-June 1944, Cum. Ed. ND Bulletin.
(d) BuPers C/L No. 8-45 of 9 Jan 1945.
(e) BuPers-BuMed Joint Ltr of 30 Apr 1945, 45-449, pg 746, Jan-June 1945, Cum. Ed. ND Bulletin, and correction thereto, BuPers-BuMed Joint Ltr 45-824 in ND Semi-Monthly Bulletin of 15 Jul 1945.
(f) BuPers-BuMed Joint Ltr of 30 Apr 1945, 45-450, pg 748, Jan-June 1945, Cum. Ed. ND Bulletin.
(g) BuPers-BuMed Joint Ltr of 29 Oct 1945 to all shore stations in continental U.S.

1. References (b), (c), (d), (e), (f), and (g) are cancelled.

2. During hostilities it was necessary to retain on active duty certain enlisted personnel not physically qualified for all the duties of their rating, but whose services could be utilized in a limited duty capacity commensurate with their disability. However, the post-war structure of the Naval Service does not contemplate the retention in active service of men physically qualified for limited duty only, except (a) those partially disabled combat-wounded personnel who desire to remain on active duty and whose services can be utilized, (b) those partially disabled ex-prisoners of war whose disability was incurred while a POW or as a result thereof, who desire to remain on active duty and whose services can be utilized.

3. Enlisted personnel who are considered to be not physically qualified for all the duties of their rating shall be brought before a board of Medical Survey for evaluation of their physical condition and recommendation as to disposition. If they are found by a board of Medical Survey to be not physically qualified for all the duties of their rating, they shall be recommended for discharge, unless the disabilities (a) resulted from wounds incurred in combat, (b) resulted from being a POW. (See paragraph 2 above.) Enlisted personnel found to be not physically qualified for all the duties of their rating, except the combat

(Not Restricted)

wounded and ex-prisoners of war aforementioned, normally will be discharged unless retention is specifically authorized by the Bureau of Naval Personnel in an individual case.

4. The following categories of enlisted personnel who have been retained on limited duty under the authority of reference (f) or other specific BuPers authorization will be brought before a board of Medical Survey at the earliest practicable date for re-evaluation and recommendation as to disposition. Final action on reports of Medical Survey in the below categories will be taken by BuPers after recommendation of BuMed:

(a) Partially disabled combat-wounded enlisted men and/or partially disabled ex-POW. (See paragraphs 2 and 3 above). These men may be retained in the Naval Service until the expiration of their voluntary terms of enlistment, or enlistments as voluntarily extended; or BuPers will authorize their discharge by reason of Medical Survey (disability) if they so request in writing. Those whose voluntary terms of enlistment have expired, shall be advised of their privilege of applying for reenlistment. Consideration will be given to waiving their combat incurred disability for the purpose of reenlistment. In cases of inductees or enlisted men of the Naval Reserve, consideration will be given to waiving their combat incurred disability for the purpose of enlistment in the regular Navy. In forwarding reports of Medical Survey information shall be included as to whether the man concerned desires to remain in the Navy, and if so, whether his retention in active service would be likely to result in aggravation of his disability, also the type of duty it is thought he is capable of performing. A signed statement of the man as to the action he desires shall be forwarded with the report of Medical Survey.

(b) Men whose disabilities are the result of disease incurred in and peculiar to combat areas (such as filariasis and malaria).

(c) Men who are temporarily unfit to perform the duties of their rating by reason of combat or operational fatigue. (Men who are unfit to perform the duties of their rating by reason of combat or operational fatigue will not be discharged from the service under such diagnosis. If the individual is unfit for service, and does not require additional treatment, a diagnosis more representative of the basic disability shall be established.)

(d) All men whose duty classification is "SA" (regardless of whether or not actually placed in a "limited duty" status).

(Not Restricted)

(e) All others retained on limited duty under specific BuPers authority, except those retained on limited duty because of motion sickness as authorized by reference (f).

5. Where practicable, personnel will be brought before a board of Medical Survey at their station of duty. However, this shall not preclude hospitalization of those individuals in need of such treatment.

6. Personnel retained on limited duty because of motion sickness, shall be transferred to a Separation Activity for discharge without the necessity of reappearing before a board of Medical Survey prior to discharge. Prior to transfer, entry shall be made on page 9 of the individual's service record that transfer for discharge is made under authority of this letter. Separation Activities receiving such personnel shall discharge them for the Convenience of the Government, provided they are otherwise physically qualified for discharge, and shall show as authority therefore this letter and Article D-9106, BuPers Manual, on the reverse.side of the discharge certificate.

7. Part I of the Instructions for the Navy Personnel Accounting System (NavPers 15, 642) which relates to the physical classification of personnel, was not intended to reflect any Navy Department policy as to retention of limited duty personnel in the Navy. However, such personnel specifically authorized to be retained in the service by BuPers will be classified accordingly.

8. This letter does not constitute authority to take final action on reports of Medical Survey without prior approval of BuPers, except as outlined in reference (a) (not to all and not needed).

Chief, BuPers. Louis Denfeld - Chief, BuMed. C. A. Swanson

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Circular Letter 47-14 12 February 1947 (Not Restricted)

To: All Ships and Stations

Subj: Shipment of Bodies from Activities Outside Continental U.S., embalming procedures for.

This letter from the Chief of BuMed modifies the procedures in use for the preparation of bodies for overseas shipment. Paragraph 3420.4, Manual of the Medical Department, as published in Circular Letter No. 46-66 of 15 April 1946 is canceled and a new paragraph in substitution furnished. In

(Not Restricted)

addition to the addressees, a copy of this letter is being sent to all persons officially listed as holders of the Manual.

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Circular Letter 47-15 13 February 1947 (Not Restricted)

To: Medical Department Activities

Subj: Organization Charts

This letter from the Chief of BuMed is addressed to Medical Department activities having a medical-officer-in-command or otherwise under the management control of BuMed. It directs that the addressees furnish to BuMed not later than 15 March 1947 up-to-date organization charts of the activity and of all principal organizational units within the activity.

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Circular Letter 47-16 13 February 1947 (Not Restricted)

To: All Ships and Stations

Subj: Permit to Import Etiological Agents or Vectors of Disease

Ref: (a) U.S. Public Health Service Permit, dtd 31 Dec 1946, T. Parran.

1. Ref. (a) authorizes the Medical Corps of the United States Navy to import into the United States, its territories or possessions, and to transfer between authorized medical installations of the Armed Forces such living disease organisms, viruses, vectors, naturally or artifically infected animals, serums, toxins, antitoxins, and analogous products as may be required in connection with clinical or scientific functions of the Medical Corps of the United States Navy.

2. Ref. (a) further stipulates, however, that the distribution of bacteria, viruses, or disease vectors in vitro or in vivo under Navy Research contracts to civilian research institutes in the continental United States, its territories or possessions, requires a permit from the Surgeon General of the U.S. Public Health Service in each instance prior to such distribution.

3. In accordance with the authority granted by ref. (a), specific permission shall be requested from the Chief of the Bureau of Medicine and Surgery in

(Not Restricted)

each instance that it is desired to import or transport etiological agents or disease vectors, and shipment shall be held until this permission is granted. Request for such permission should include full information concerning the purpose for which it is desired to import or transport the etiological agents or disease vectors.

4. The permission required in para (3) above shall be considered to be automatically granted and need not be requested in the following situations:

(a) Organisms recovered from outbreaks of food poisoning or dysentery, or streptococcal disease, to be shipped to the Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md. for typing and/or research.

(b) Bacteria, viruses, disease vectors, and infected animals necessary to research projects which have been approved by BuMed and which are carried on by military (not civilian) agencies.

--Chief, BuMed. C. A. Swanson

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